

Abstract

Project STEP. The objective of the National Science Foundation-funded Science and Technology Enhancement Program (STEP) is to provide training within the field of secondary education to engineering and science graduate students with the goal that the fellows will continue to bring their expertise to high school classrooms throughout their careers. This is facilitated through a year-long collaboration of the graduate fellow and a team of four teachers within a given high school.

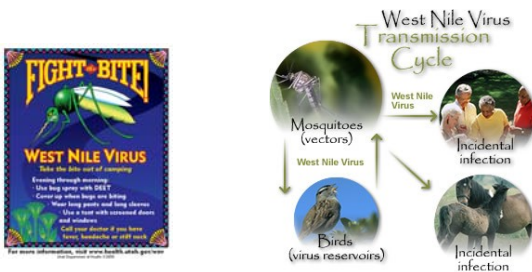
Fellow responsibilities. As a fellow, I am to design lessons pertaining to a topic within the established curriculum, placing the content within the context of engineering, my personal research, and Cincinnati, demonstrating to the students that their current studies are applicable to their daily lives.

The lesson. In 1999, the West Nile Virus emerged in New York City. Human infections in Ohio were first reported in 2002, with Hamilton County having the second highest number of infected persons in the state.

Students will determine the number of humans, birds, and mosquitoes that have tested positive for West Nile Virus since its emergence in the US. Data will be tabulated both by state and national total. Students will compile and graph the data using a log based scale. After learning about the disease and how it is spread, students will engineer a device to help control the spread of West Nile Virus. My research focuses on the bacteria *E. coli* O157:H7. Therefore, *this lesson pertains to my research* as I think about the spread of disease on a daily basis.

Assessment. Analysis of the identical pre- and post- activity quiz given to two classes indicated that content knowledge increased by an average of 61% in Class one and 60% in Class two. Individual results categorized by class and student can be found in the results section.

Introduction



The lesson: By accessing epidemiological data, students tabulate the number of humans and birds infected with West Nile Virus in each state over the course of 5 years. Data is expressed logarithmically and graphed using EXCEL spreadsheets.

Activity

Gaining attention:

- Students watched news reports of West Nile Virus infections attained from Cincinnati's WCPO.



During the group activity, students:

- Accessed maps that tracked the progression of West Nile Virus across the US by monitoring infected organisms



- Counted the number of humans and birds infected with WNV in 2002-06 in their assigned states



- Used worksheets to organize the data



- Compiled the data and used EXCEL to graph the data using a logarithmic scale



Student Feedback

Class One

Liked best:

- The video
- It taught me a lot about affected regions
- Using EXCEL
- I learned about how people and birds become infected with West Nile Virus

Liked least:

- The video
- Using EXCEL
- It was confusing

Class Two

Liked best:

- It was fun to see all the numbers of infected people and birds
- Making the graphs
- Working on the computer doing something I had never done before

Liked least:

- Looking up the information
- Dealing with so many statistics
- It took too long

Rate your level of learning:

	A lot	A little	None
Class One	29%	71%	0%
Class Two	27%	73%	0%
Combined	29%	71%	0%

Did this lesson increase your confidence about your ability to learn math science?

	Definitely	Sort of	Not sure	No
Class One	18%	71%	0%	12%
Class Two	0%	73%	18%	9%
Combined	11%	71%	7%	11%

Rate your interest in engineering:

	Very	Somewhat	Unsure	None
Class One	0%	59%	35%	6%
Class Two	27%	27%	18%	27%
Combined	11%	46%	29%	14%

Did this lesson affect your interest in engineering?

	Increased	Decreased	No effect
Class One	24%	0%	76%
Class Two	9%	9%	82%
Combined	18%	4%	79%

Figure 1. Student feedback. Immediately following the activity, students completed anonymous feedback forms.

Assessment Results

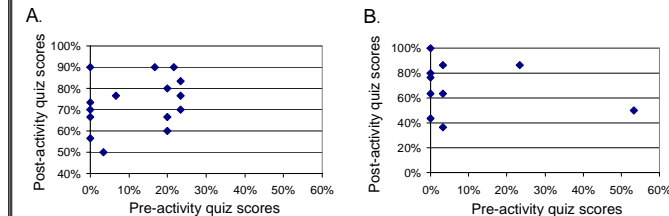


Figure 2. Post-quiz results. A) Class one and B) Class two completed an quiz both before and after the activity. The percentage correct on the pre-quiz (x-axis) is plotted versus the percentage correct on the post-quiz (y-axis). Each diamond represents the both pre- and post-scores of one student.

Conclusions

- 100% of students reported that they felt they had learned during the lesson which is supported by the fact that:
 - Class A scores increased by 61%
 - Class B scores increased by 60%
- A thorough walk-through of EXCEL collectively as a class is needed before allowing the students to work in groups

Acknowledgments

Project STEP is funded through NSF Grant # DGE058532.